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# VULCANIZED WOOD.

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# WOOD VULCANIZING.

The process of vulcanizing lumber for *curing, preserving, strengthening, and beautifying*, having met practical tests of the severest nature for eight or ten years, now claims superiority over any and every other method.

This process is the simplest and most practical of all known methods. The wood is subjected to an intense degree of heat sufficient to change into liquid form all its constituents except the fibre, while a high atmospheric pressure confines this liquid within, and effectually closes the pores of the fibre. The germ of decay is killed by this intense heat, and a chemical change is produced, which chemical analysis proves to be neither more nor less than the creation of an incomparable antiseptic and preservative compound, into which nothing but the natural elements of the wood enter.

There is *no known limit* to the age of "vulcanized" wood, as it has withstood the ravages of time, climate, heat, moisture, atmospheric influences, and *every* other adverse condition, for many years.

The transverse and crushing strength is very materially increased, and this increases the life of buildings wherein it is used.

For mill construction the slight increase in cost is but a trifle to the loss occasioned on account of renewals, to say nothing of labor and cost of new stock.

The additional cost is about \$10 per thousand feet.

For mill floors, that are subjected to hard and constant wear by moving heavy merchandise, this process is especially desirable, as "vulcanized" lumber will not "brush up" like other wood, and is rendered much more dense than by other processes.

THE HASKIN WOOD VULCANIZING CO.,  
40 WALL STREET, NEW YORK.

SAMUEL D. CRAFTS, N. E. Agent,

45 KILBY STREET, BOSTON.  
ROOM 1.

Edward Atkinson, Esq., writes this letter to one of the members of the Boston Manufacturers Mutual Fire Insurance Co.

BOSTON MANUFACTURERS MUTUAL FIRE INSURANCE CO.,

31 Milk Street.

BOSTON, April 16, 1891.

*Dear Sir:* In reply to your inquiry regarding the so-called "vulcanizing" process of treating timber, I would say, that it seems to be a process by which the albumen and other parts of the green wood which are subject to fermentation, and thereby promote decay, to the destruction of the timber, are converted by heat into a condition in which they cannot ferment; the germ or ferment being destroyed. In this baked or completely seasoned condition they appear to be maintained within the timber itself, apparently giving it greater strength and greater density, with, of course, much less liability to swell and shrink under the changes in the humidity of the atmosphere to which timber or plank may be exposed.

We have as yet no positive experience within the range of our own members; but, from the investigation that I have thus been able to make, I should say that all manufacturers who find it necessary or expedient to lay floors either upon or near the ground, or who must subject floors to constant saturation with water, or who must make use of timber and plank in buildings like dye houses and bleacheries,—of which floor and roof are subjected to the maximum of humidity,—will probably find in the "vulcanized" timber a very much more durable material than has ever yet been placed at their disposal. Reserving our absolute judgment until, through time and experience under our own observation, we may be able to sustain these views, I give them to you for what they may be worth on our primary investigation of the subject.

Yours very truly,

EDWARD ATKINSON,

*President.*

RECORDS OF TESTS BY TRANSVERSE STRESS,

Mechanical Laboratory—Department of Engineering,  
STEVENS INSTITUTE OF TECHNOLOGY.

LABORATORY NUMBER.	DIMENSIONS.		DEFLECTION, ACTUAL.	BREAKING LOAD.		TOTAL DEFLECTION.	SPECIFIC GRAVITY.	MODULUS OF ELASTICITY.
	DISTANCE BETWEEN SUPPORTS.	BREADTH.		DEPTH.	ABSOLUTE P.			
YELLOW PINE UNTREATED.								
3,035	40	1.96	1.98	.030	1,570	12,273	2	729
No Knots or Cracks,								1,752,000
3,036	40	1.96	1.98	.031	1,585	12,391	1.57	717
No Knots or Cracks,								1,694,000
3,037	40	1.97	1.96	.030	1,540	12,000	1.67	704
No Knots or Cracks,								1,839,000
			Average,			12,555	1.75	715
								1,761,000
YELLOW PINE VULCANIZED.								
3,041	40	1.96	1.95	.028	1,700	13,420	1.50	794
No Knots or Defects,								2,058,000
3,042	40	1.96	1.96	.030	1,630	13,000	1.60	793
No Knots or Defects,								1,806,000
3,043	40	1.94	1.94	.029	1,735	14,310	1.75	793
No Knots or Defects,						13,580	1.62	793
			Average,					1,937,000

THE ABOVE TESTS WERE MADE BY PROF. R. H. THURSTON.

Abstract from report of Alfred P. Trautwein, dated New York, November 20, 1884:

"Test by compression on the Olsen Machine of the Stevens Institute, Hoboken, upon Yellow Pine.

"These were made upon samples of three different lengths cut out of the plank, as shown, and 3", 4", and 5" in length respectively; the ends were accurately squared and the cross section of the sample was approximately one square inch."

*A. 3 Inch Samples.*

A. Natural, crushed at . . . . .	5,300 lb.	A. Vulcanized, crushed at . . . . .	7,750 lb.
B. " " " . . . . .	6,500 "	B. " " " . . . . .	7,100 "
C. " " " . . . . .	5,900 "	C. " " " . . . . .	7,500 "
Average, 5,900 lb.			Average, 7,450 lb.

*B. 4 Inch Samples.*

A. Natural, crushed at . . . . .	5,100 lb.	A. Vulcanized, crushed at . . . . .	7,250 lb.
B. " " " . . . . .	5,800 "	B. " " " . . . . .	7,000 "
C. " " " . . . . .	5,500 "	C. " " " . . . . .	7,100 "
Average, 5,483 lb.			Average, 7,116 lb.

*C. 5 Inch Samples.*

A. Natural, crushed at . . . . .	6,500 lb.	A. Vulcanized, crushed at . . . . .	7,350 lb.
B. " " " . . . . .	6,000 "	B. " " " . . . . .	7,000 "
C. " " " . . . . .	6,500 "	C. " " " . . . . .	7,600 "
Average, 6,333 lb.			Average, 7,310 lb.

Average all compression tests, Natural . . . . .	5,900 lb.
" " " " " Vulcanized . . . . .	7,294 "
Increase, 1,394 lb. = 23.6%	

[COPY.]

NEW YORK, November 26, 1884.

SAMUEL E. HASKIN, General Manager.

*My Dear Sir:* The investigation of the electrical resistance of your samples of "vulcanized" woods has been so nearly completed, and with such good results, that I hasten to say that the prepared woods are, with a single exception, very greatly improved by the process. I have had samples of similar woods prepared for tests, and have had the resistance of the treated and the untreated woods measured, with the following results:—

Common Spruce offers *three times* the resistance after being vulcanized that it gave before treatment. White Oak, by your treatment, acquires twice the non-conducting power that the untreated has. White Pine, treated, has three and three-quarters times the non-conducting power that is possessed by the untreated wood. Yellow Pine is an exception, and seems to gain conductivity by treatment in the proportion of nearly five to one. Cherry has one and a half times the resistance to the passage of the electric current after treatment that it exhibits before. I had no specimen of Black Oak for comparison, and cannot give the figure for that wood, but presume it to be similar to that for White Oak.

I will give you a more detailed report as soon as completed. Meanwhile, this will probably be of use to you.

Very respectfully yours,

R. H. THURSTON,  
*Director.*

Black Oak is an enormously better non-conductor than either of the other woods.

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[COPY.]

SCHOOL OF MINES, COLUMBIA COLLEGE.

49TH ST. AND 4TH AVE., NEW YORK, Feb. 25, 1890.

*My Dear Sir:* I have examined the sample of Oak wood, preserved by your process, which you placed in my hands.

I find that it is entirely different from the original wood, of which I also examined a sample. The treatment to which the Oak has been exposed has effected a radical chemical change in its character, and it now contains 11.91% of materials, most of which have resulted from the action of heat. These I have succeeded in separating into:—

Neutral Oils, Turpines, etc.	0.36%
Phenols	0.77%
Resinous Acids and other bodies	10.78%
	11.91%

A very considerable portion of this 11.91% of material consists of antiseptic and preservative substances, which will act to protect the wood from decomposition and decay. They have also radically changed the appearance of the wood, producing what would have otherwise required a long lapse of time. The wood before treatment does not contain the above mentioned substances, and would be liable to be attacked by microscopic fungi, and to undergo decay when exposed to air and moisture.

In conclusion I would say, that your process seems to be a remarkably simple and effective one for improving the appearance, and very greatly increasing the durability, of timber, and protecting it from the agencies which result in destroying, by decay, timber which has not been treated.

Very sincerely yours,

(Signed)

C. F. CHANDLER, PH. D.

To Mr. SAMUEL E. HASKIN,  
40 Wall Street, New York City.

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Extract from report dated April 24, 1890, of Captain Henry Erben, U. S. N., who was appointed chairman of the board appointed to investigate the vulcanizing process.

"The board made a test to satisfy itself as to whether the heat to which the wood is subjected injures the fibre or makes it brittle.

"Strips about 36 inches long and one inch cross section were sawed from the same plank. Some of these strips were then vulcanized and the rest left in their natural condition. One strip of each kind was subjected to a breaking strain by successively suspending weights to one end, the other end being held in a vise, and observing the corresponding deflections of the weighted end from the horizontal plane. The following are the results:—

UNVULCANIZED.		VULCANIZED.	
WEIGHTS.	DEFLECTIONS.	WEIGHTS.	DEFLECTIONS.
12 lbs.	1 5/8 inch.	12 lbs.	1 inch.
18 "	2 3/4 "	18 "	2 1/4 "
24 "	3 1/8 "	24 "	3 1/2 "
30 "	3 5/8 "	30 "	4 1/8 "
42 "	4 3/4 "		
56 "	Strip broke.	66 lbs.	Strip broke.

It is thus evident that, at least, the treatment has not injured the tenacity of the wood, but, on the contrary, has slightly increased it, and this result agrees with the tests at the Stevens Institute."

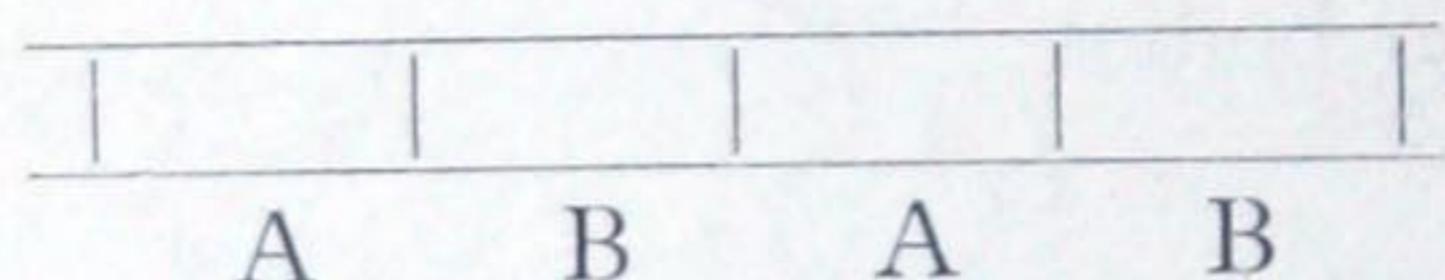
[COPY.]

April 1, 1891.

Mr. HARRY S. STEVENS, General Manager,  
The Haskin Wood Vulcanizing Co.,  
No. 40 Wall Street, New York.

*Dear Sir:* In regard to the analysis of "vulcanized" Georgia Yellow Pine, I submit the following:—

I procured a Yellow Pine cross tie 6" x 8" x 8', and divided same into four equal parts, namely:



The alternate sections "A" and "A" I then had submitted to the vulcanizing process, as carried on at your Works, Nineteenth Street and Avenue B, this City; the remaining sections "B" and "B" not being subjected to the process, but kept in their natural state. I then made a careful analysis of both the treated and untreated sections.

I find that the treatment has produced a radical change in the chemical composition of the wood. The moisture has been largely eliminated, the percentage of resinous matter considerably increased, and the albuminous substance coagulated, preventing the decomposition of the wood by the action of atmospheric changes.

This change in the chemical composition produces even more marked results in the physical properties of the wood, as shown in the tests made by Prof. R. H. Thurston and Mr. A. P. Trautwein, at the Stevens Institute of Technology, Hoboken, N.J.

By these comparisons, I am forced to the conclusion that the wood treated by the vulcanizing process is vastly superior to the untreated for all constructive purposes.

Very respectfully yours,

(Signed)

HENRY A. BANG, M. E.

[COPY.]

MANHATTAN RAILWAY COMPANY.

CHIEF ENGINEER'S OFFICE.

Col. S. E. HASKIN,

42 Wall Street, New York City.

No. 71 BROADWAY, NEW YORK, March 1, 1889.

*Dear Sir:* In reply to your inquiries as to the life of the cross-ties and planking which had been treated by the vulcanizing process, which we placed on the structure six years ago this month, I have to say, timber is sound and the surface of the ties and planking very hard.

There are no indications of decay at the end of those planks which were vulcanized, while the planks not treated, and placed on the structure about the same time, are decayed at the ends or where they are nailed to the supporting timbers. I am inclined to think the process of vulcanizing will soon be found to be the best way of preserving timber.

Very respectfully yours,

(Signed) ROBERT I. SLOAN,  
*Chief Engineer.*

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[COPY]

Capt. HENRY ERBEN, U. S. N.,  
Brooklyn Navy Yard, Brooklyn, N.Y.

February 7, 1890.

*Dear Sir:* Replying to your enquiry of the 4th inst. relative to "vulcanized" timber, it gives me pleasure to submit the following facts:—

The first lot of cross ties, 5" x 8" x 8' long, we had vulcanized February 10, 1883; the next lot, October, 1883; the next lot, in September and October, 1884; the next of guard rail, 6" x 8" x 30' in length, and at the same time a lot of slatting 2" x 6" x 24' and 30' long; all of which is today in the track.

We had about a million feet treated at that time. These ties and slatting were placed alongside of untreated timber, and today the treated ties are just as sound and sweet as though they had just come from the tree.

It is important, however, that timber treated by this process (YELLOW PINE) should be from untapped trees and free from shakes and sap, otherwise it is hardly worth the while to treat it. The yellow pine timber obtained from North Carolina and other points in the South where turpentine is made, has been so drained of resin that a good job of vulcanizing cannot be done.

I am of the opinion, after comparing other methods of treating timber with the vulcanizing process, that the latter is superior to all others.

Respectfully yours,

(Signed) F. K. HAIN,  
*General Manager.*

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[COPY.]

Capt HENRY ERBIN, U. S. N.,  
Room 37, P. O. Building, City.

March 13, 1890.

*My Dear Sir:* Replying to yours of the 6th inst., in answer to the questions contained therein, relative to "vulcanized" wood, I have to reply as follows:—

To your first question, "Do you use it exclusively and in preference to any other kind of wood for the repairs that are daily made on the elevated roads?" I answer in the affirmative.

Your second question, "What, approximately, is the amount of this wood annually used for such repairs?" I refer you to the accompanying statement.

Third, "From your experience do you consider that it withstands better the deteriorating influence of wind, rain, heat, and sun, than other prepared woods or wood in its natural state?" I reply that I do.

Respectfully yours,

(Signed) F. K. HAIN,  
*General Manager.*

[COPY.]

GRAND CENTRAL STATION, NEW YORK, March 28, 1891.

Mr. H. S. STEVENS, General Manager,  
The Haskin Wood Vulcanizing Co.,  
40 Wall Street, New York City.

Dear Sir: In reply to your inquiry regarding my opinion upon your process of vulcanizing for the purpose of preserving wood from decay, etc., and especially with reference to the Yellow Pine railroad ties which were treated by your Company's process, and laid in the tracks of the switch yard of this company in the spring of 1884, having been in constant use and exposed to the full action of the elements, and subjected to extraordinary wear and tear, I have to say, that on the sixth day of March, 1891, I had two of said ties taken up for the purpose of making an examination of their condition, and was much surprised to find them in a perfect state of preservation, and practically as good as new ties, so far as wear was concerned, the spikes having held firmly as they were originally driven.

During my experience in the railroad business, of over forty years, during which time I have used all kinds of timber in railroad work, and have tried the various kinds of treatment for the preservation of timber from decay, I am free to state that I have never found any method that has shown such a satisfactory result; and I believe your process of vulcanizing will increase the durability of timber at least fifty per cent.

The remaining ties that were treated by your Company's process are in the same place as first laid, and from present indications they seem good for seven years more service.

In conclusion I would say, that I think it would be to the interest of any company using timber which is exposed to the elements to at least give this process a trial, as they could not fail to be convinced of its effectiveness.

Yours respectfully,

(Signed) ROBT. WHITE,  
*Supervisor of Tracks and Repairs.*

[COPY.]

STATE OF NEW YORK.

CITY AND COUNTY OF NEW YORK, ss.

JOHN DAILEY, being duly sworn, deposes and says:—

That he was in the employ of the New York Central and Hudson River Railroad Company during the year 1884, and that he has been in the employ of said Company since, and is still in the employ of said Company.

That in the spring of 1884 he assisted in laying, in the tracks of said Railroad Company in the switch yard of said Company, in the City of New York, six (6) Yellow Pine railway ties, which ties he was informed and believes had been subjected to a process of preserving known as "vulcanizing," and then carried on at the vulcanizing plant at the foot of Nineteenth Street and East River. That to this deponent's knowledge said ties remained in said tracks and were in constant use up to the sixth day of March, 1891, when two of said ties were taken up in the presence of said deponent and found to be in sound condition and a perfect state of preservation. That four (4) of said ties are now in the yard of said Railroad Company, and still in use, and are in a sound condition (as also stated by Mr. Robert White, Supervisor of Tracks and Repairs of Grand Central Station). To this deponent's knowledge said ties, while in said tracks, were fully exposed to the elements and subject to extraordinary wear and tear.

(Signed) JOHN X DAILEY.  
his  
mark.

Sworn to before me this 26th day of March, 1891.

A. LANSING BAIRD,  
*Notary Public, N.Y. Co.*

